EXHIBIT 8 : FCC 2.1053 (FIELD STRENGTH MEASUREMENTS OF SPURIOUS RADIATION)

Part 2.1053(a)(b)(1) Field Strength Measurements of Spurious Radiation

Part 2.947 Measurement Procedure Employed

The transceiver under test and the associated test equipment was set up as shown in Figures 8.1 and 8.2 (Pages 8-5 and 8-6).

The transceiver was tuned up on the desired test frequency in accordance with the Instruction Manual. The transmitter was modulated with the standard two tone test signal consisting of equal level 400 Hz and 1800 Hz tones and the output level was adjusted to 150 watts PEP.

Two measurement techniques were employed. At frequencies below about 30 MHz two loop antennas were used, employing the loop substitution technique described below. At frequencies above approximately 30 MHz, an adjustable dipole was used as a receiving antenna and field strength was measured with a method suggested by Hewlett-Packard Application Note 150-10. After measurement of the radiated spurious field strength, the field strength was then evaluated against a standard half-wave dipole.

The distance between the transceiver under test and the spurious measurement antenna was chosen to be the optimum distance that could be used and stay within the useable range of sensitivity of the spectrum analyzer and the drive voltage available from the signal generator. This distance was 3 meters for the loop substitution technique and 10 meters for the tuned dipole technique.

The spectrum was investigated for a test frequency in each of the eight transceiver bands, from below the lowest frequency generated in the equipment to 1000 MHz using the various test antennas and the spectrum analyzer.

An initial wide band scan was used to facilitate the identification of spurious frequencies. A narrow band scan of each individual spurious frequency was then made to more accurately identify it and measure it's maximum amplitude.

Table 8.1 (Pages 8-8, through 8-10) lists the reduced data for a test frequency in each of the nine Marine bands. Attenuation levels of up to approximately 110 dB are listed.

THE TUNED DIPOLE TECHNIQUE:

Above approximately 30 MHz, each spurious frequency was identified, the receiving dipole adjusted to one half wavelength and both dipole and transceiver adjusted in height and orientation for maximum signal level.

The spurious attenuation was then calculated using the following method:

STEP 1 Field Strength, E (V/m)

$E = 10 ** [(V_r - 13 + A_c + K) / 20]$

where, V_r = received power in dBm

-13 = conversion from dBm to dBV in a 50 ohm system

A_c = cable loss at F_s in dB

K = Antenna Factor at F_s in dBm/m

STEP 2 Spurious Attenuation, A (dB)

Radiated power of spurious emission in Watts, $P_t = (R^2 * E^2) / 30G$

Where, R = distance in meters between dipole and transceiver

G = dipole gain over isotropic = 1.64

Attenuation, $A = 10 * \log (P_t / P_o)$

Where, P_o = Rated mean power of transmitter

EXAMPLE:

Reading from the analyzer, spurious emission at 75 MHz:

V_r = -61.9 dBm, K = 6.1 dB/m, and A_c = 1.5 dB

E = 10 ** [(-61.9 - 13 + 1.5 + 6.1) / 20] V/m

E = 10 ** [-67.3 / 20] V/m = $433 * 10^{-6}$ V/m

For R = 10 m we get,

$P_t = ((10\text{ m})^2 (.000433\text{ V/m})^2) / (30)(1.64) = 378 * 10^{-9}$ W

$A = 10 * \log (378 * 10^{-9}\text{ W} / 75\text{ W}) = -83$ dB

THE LOOP SUBSTITUTION TECHNIQUE:

The level of transmitter spurious signals below approximately 30 MHz were measured by using a loop substitution technique suggested by 1948 IRE Standards on AM Receiver Testing Methods. This technique uses the signal from a second loop antenna and signal generator as a substitute for the spurious signal. Test methods are suggested by the EIA Specification number RS 152. Additional reference data was obtained from ITT Reference Data for Radio Engineers, Fifth edition and the Instruction Manual for the MLA-1001B loop antenna.

The transmitter spurious signals were initially measured using the test setup pictured in Figure 8.3, Page 8-7. The transmitter was then replaced by the signal generator and the second loop antenna as pictured in Figure 8.4, Page 8-7. This procedure was repeated for all test frequencies and the results were recorded.

The spurious signal level was then calculated using the following technique:

STEP 1 Field Strength, E (V/m)

When a current (I) is fed into Loop L1 from a high frequency source, the Electric Field induced at Loop L2 from L1 is determined by the following formula: (Reference: MLA-1001B Instruction Manual)

$$E = 188.5 * N * A^2 * I / R^3$$

Where, E = Field strength in V/m

N = Turns in Loop = 1

A = Loop Radius = 0.125m

R = Loop-Loop Spacing = 3 m

I = L1 Current

$$E = 0.1091 * I$$

Substituting: I = V/R gives

$$E = 0.0008 V$$

Where, R = Loop Equivalent Resistance (136 ohms)

V = source generator voltage

STEP 2 Spurious Attenuation, A (dB)

Radiated power of spurious emission in Watts, $P_t = (R^2 * E^2) / 30G$

Where, R = distance in meters between loop and transceiver

G = dipole gain over isotropic = 1.64

Attenuation, $A = 10 * \log (P_t / P_o)$

Where, P_o = Rated mean power of transmitter

EXAMPLE:

To produce the same spectrum analyzer reading as a spur the source loop (L1) needed to be driven with an 8 dBm = .56 V signal. The loop equivalent resistance is 136 ohms so the loop current is:

$I = .56\ V / 136\ \Omega = 4.13\ mA$

$E = .1091\ I = 451 * 10^{-6}\ V/m$

For R = 3 m we get,

$P_t = ((3\ m)^2\ (.000451\ V/m)^2) / (30)(1.64) = 37.2 * 10^{-9}\ W$

$A = 10 * \log (37.2 * 10^{-9}\ W\ / 75\ W) = -93\ dB$

These equations were solved for each spurious frequency found. The table below lists the attenuation for each spurious frequency found. The column of the reading indicates which technique was used in each case.

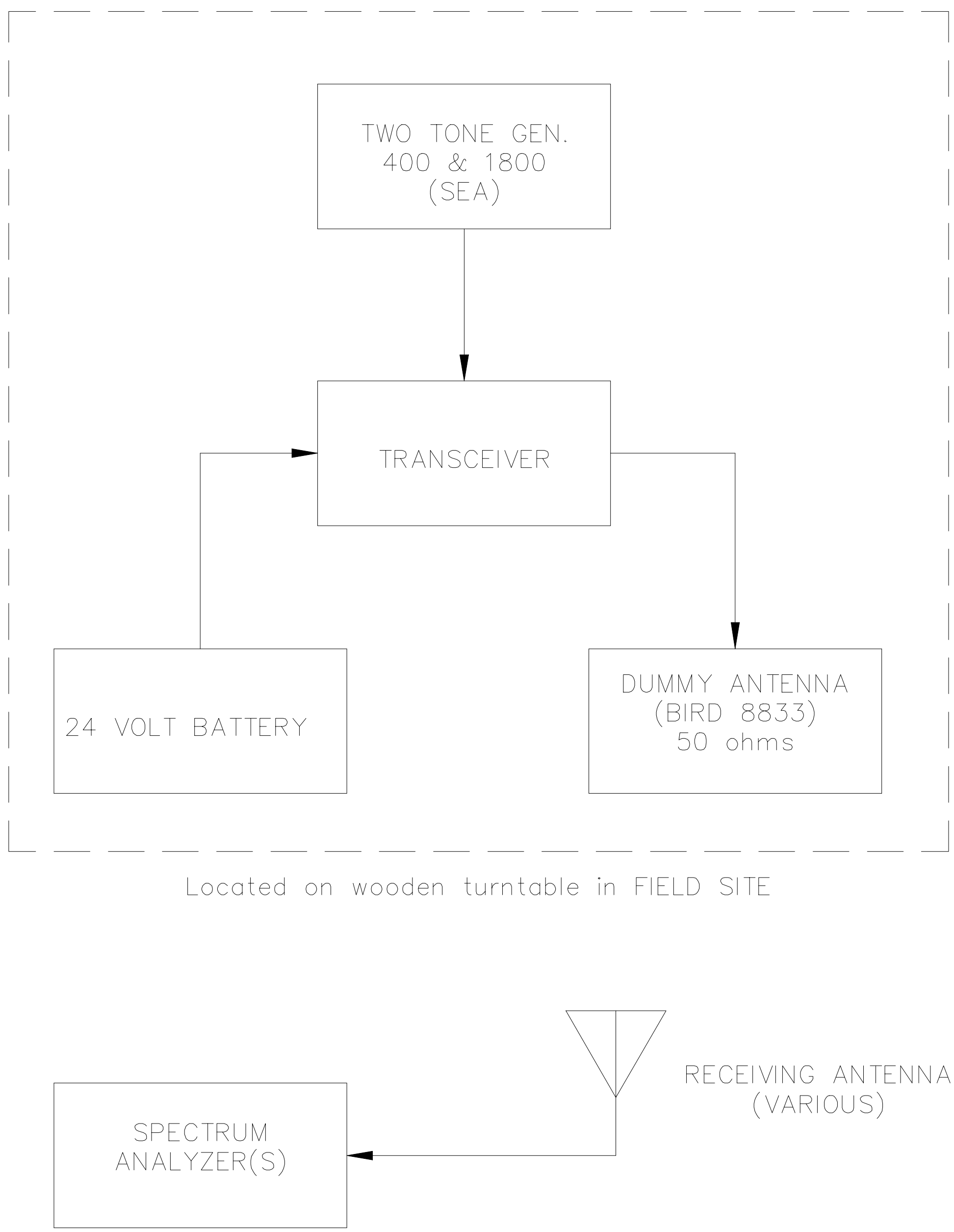

FIGURE 8.1 TEST SETUP, FIELD STRENGTH OF SPURIOUS RADIATION TESTS

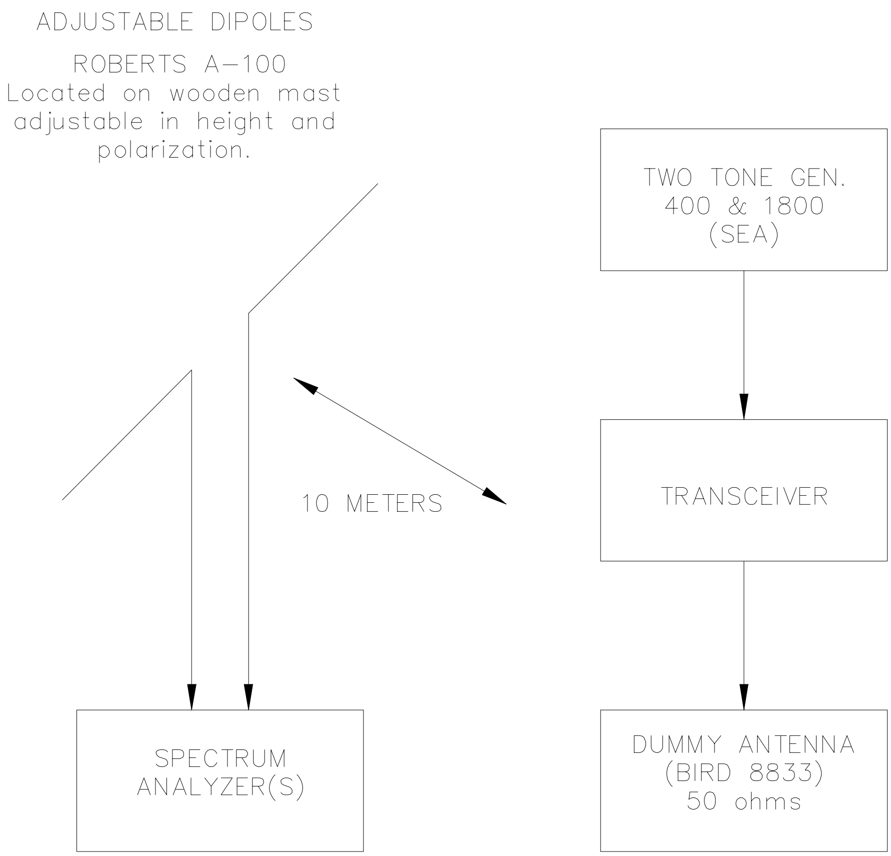

FIGURE 8.2 TEST SETUP, FIELD STRENGTH OF SPURIOUS RADIATION TESTS

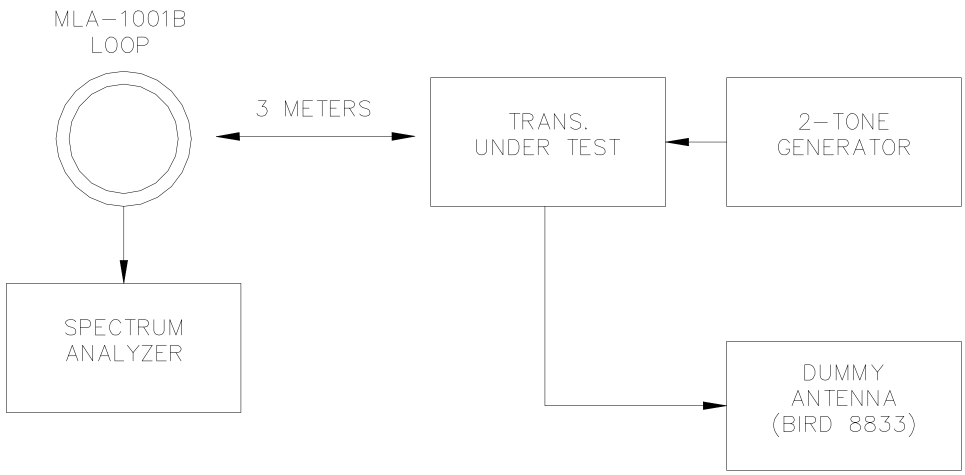

FIGURE 8.3 TEST SETUP, FIELD STRENGTH OF SPURIOUS RADIATION TESTS

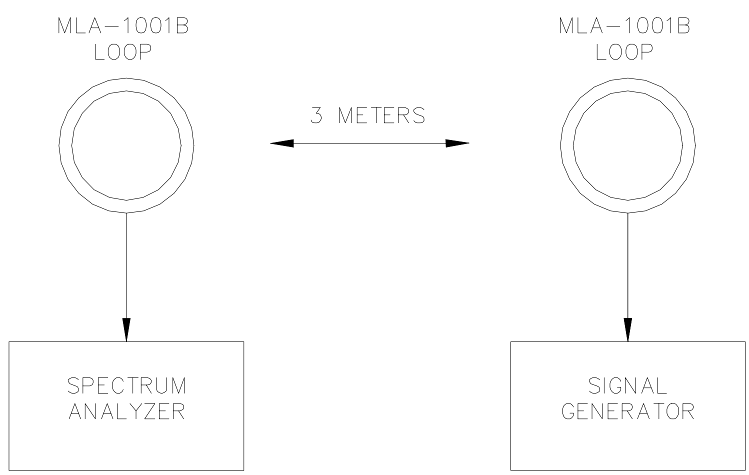

FIGURE 8.4 TEST SETUP, FIELD STRENGTH OF SPURIOUS RADIATION TESTS

TABLE 8.1 RESULTS OF FIELD STRENGTH MEASUREMENTS

F_0 (kHz)	F_{SPUR} (MHz)	*N	ATTENUATION (dB)	
			LOOP	DIPOLE
1619.0	NONE			
2182.0	39.276	18		-116 dB
	43.640	20		-112 dB
	48.004	22		-116 dB
4125.0	16.500	4	-109 dB	
	33.000	8		-110 dB
	37.125	9		-115 dB
	41.250	10		-105 dB
	45.375	11		-116 dB
	49.500	12		-106 dB
	53.625	13		-112 dB
	57.750	14		-113 dB
6215.0	12.430	2	-93 dB	
	24.860	4	-109 dB	
	31.075	5		-117 dB
	37.290	6		-94 dB
	43.505	7		-111 dB
	49.720	8		-95 dB
	55.935	9		-112 dB
	62.150	10		-106 dB
	68.365	11		-110 dB
	80.795	13		-105 dB

	93.225	15		-92 dB
	99.440	16		-108 dB
8291.0	16.582	2	-106 dB	
	33.164	4		-98 dB
	41.455	5		-101 dB
	49.746	6		-92 dB
	58.037	7		-104 dB
	66.328	8		-103 dB
	74.619	9		-108 dB
	82.910	10		-103 dB
	99.492	12		-105 dB
12290.0	24.580	2	-104 dB	
	36.870	3		-98 dB
	49.160	4		-93 dB
	61.450	5		-100 dB
	73.740	6		-97 dB
	86.030	7		-97 dB
	98.320	8		-99 dB
	110.61	9		-109 dB
16420.0	32.840	2		-95 dB
	49.260	3		-94 dB
	65.680	4		-86 dB
	82.100	5		-88 dB
	98.520	6		-93 dB
	114.94	7		-104 dB

18840.0	37.680	2		-90 dB
	56.520	3		-89 dB
	75.360	4		- 83 dB
	94.200	5		-101 dB
	113.04	6		-100 dB
	150.72	8		-106 dB
	169.56	9		-105 dB
	188.40	10		-103 dB
22159.0	44.318	2		-94 dB
	66.477	3		-88 dB
	88.636	4		-89 dB
	110.795	5		-105 dB
	132.954	6		-103 dB
	155.113	7		-105 dB
	177.272	8		-103 dB
	310.226	14		-96 dB
25115.0	50.230	2		-86 dB
	75.345	3		-84 dB
	100.46	4		-90 dB
	125.575	5		-106 dB
	150.690	6		-103 dB
	175.805	7		-103 dB
	200.920	8		-99 dB

EXHIBIT 9 : FCC 2.1055 (FREQUENCY STABILITY)

Part 2.1055(a)(2) Frequency Stability Vs. Temperature

Part 2.1055(c) Time Required For Frequency Stabilization

Part 2.1055(d)(1) Frequency Stability Vs. Primary Supply Voltage

Part 2.947 Measurement Procedure Employed

FCC Part 2.1055(a)(2) Frequency Stability as a Function of Temperature Test:

The transceiver and the associated test equipment were set up as shown in Figure 9.1 (Page 9-2). The temperature in the enclosure was lowered to -30 C and allowed to stabilize. The chamber temperature was then allowed to return slowly to room temperature. The transmitter frequency was recorded for every 5 degree temperature increment. The chamber temperature was slowly raised to +60 C. The transmitter frequency was again recorded for every 5 degree temperature increment. The test results are represented by the graph presented in Figure 9.3 (Page 9-4).

FCC Part 2.1055(c) Time Required for Frequency Stabilization Test:

The transceiver and the associated test equipment were set up as shown in Figure 9.1 (Page 9-2). The enclosure temperature was lowered to -30 C and the temperature allowed to stabilize. The transceiver was then energized and the output frequency recorded in thirty second intervals for a period of 7 minutes. During this period the temperature of the enclosure was held to within ±2 C. The above test was repeated at temperatures of 0C and +30C and the results are presented in Figures 9.4, 9.5 and 9.6 (Pages 9-5, 9-6 and 9-7).

FCC Part 2.1055(d)(1) Frequency Stability vs. Primary Supply Voltage Test:

The transceiver and the associated test equipment were set up as shown in Figure 9.2 (Page 9-3). This test was performed with a normally functioning transceiver. (Primary Voltage Design Center 27.2 Volts DC.) The primary line voltage was then varied in 0.25 volt increments from 21.6 volts DC (-15%) to 31.2 volts DC (+15%) and the frequency of the transmitter was checked and recorded at each increment. Since no frequency controlling elements of the radio run directly from the primary line voltage there was no variation of frequency over this voltage range.

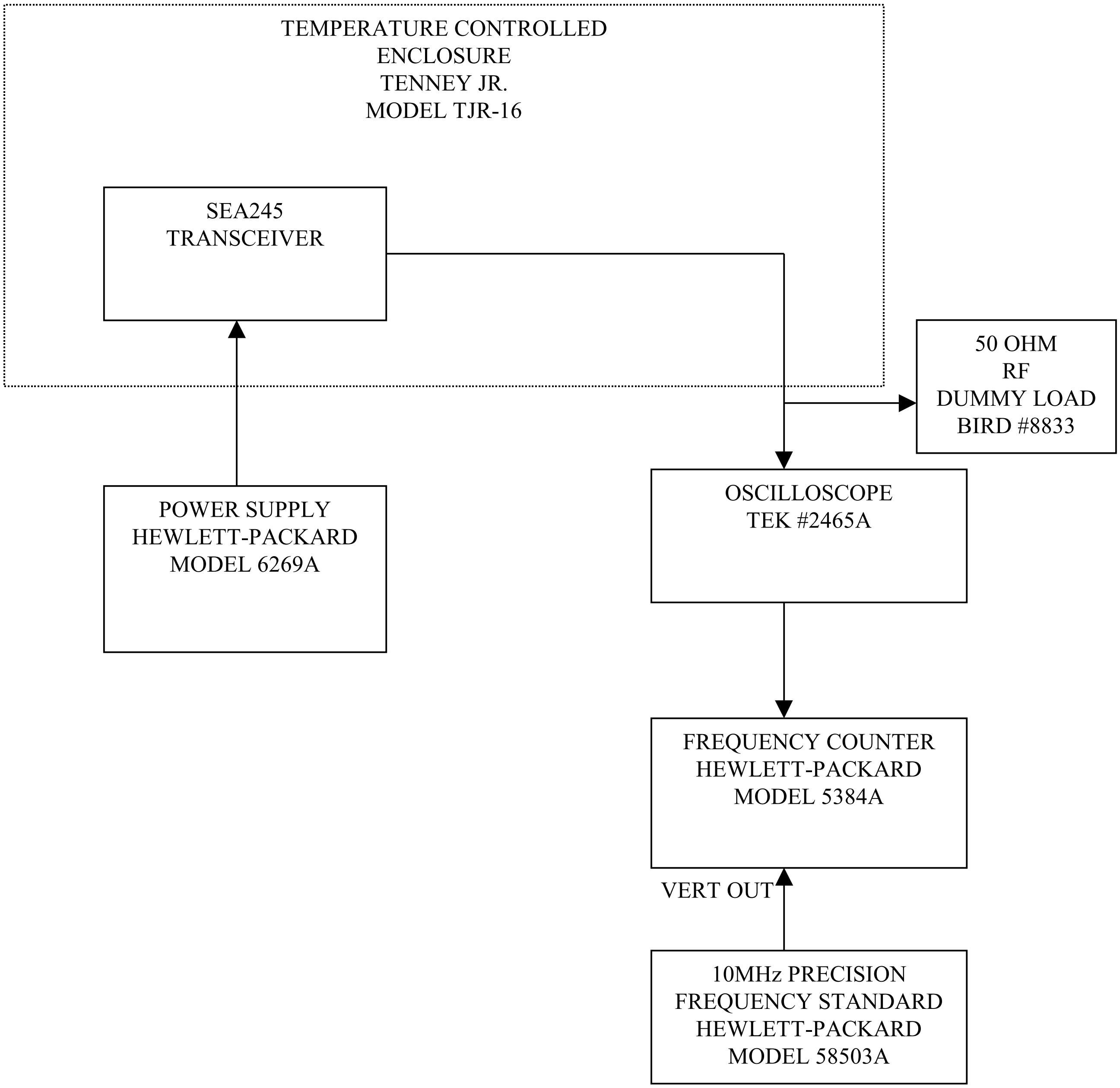

FIGURE 9.1 TEST SETUP FOR FREQUENCY STABILITY VS. TEMPERATURE AND TIME IN ACCORDANCE WITH SECTION 2.1055 (a) (2) (c)

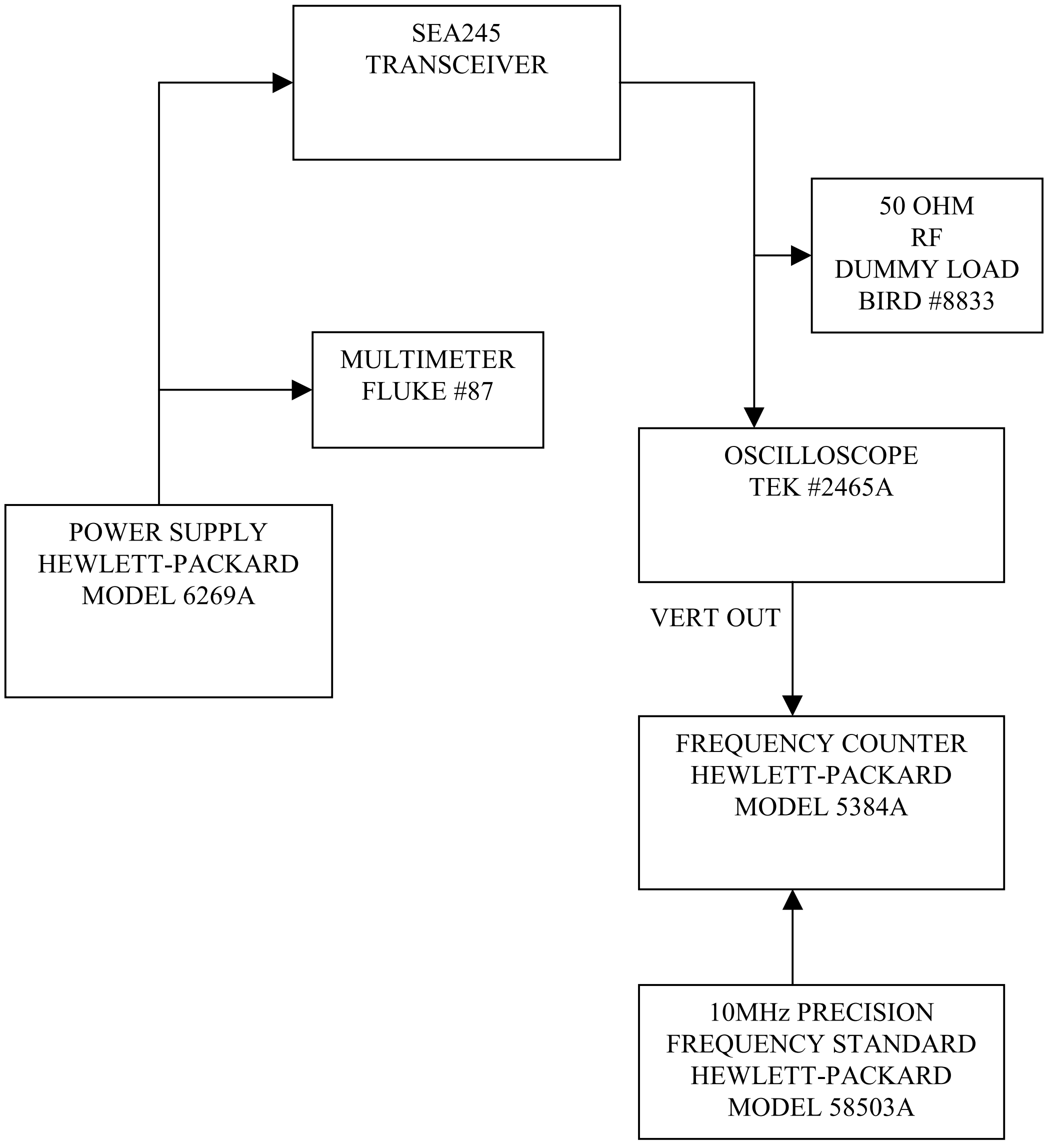

FIGURE 9.2 TEST SETUP FOR FREQUENCY STABILITY VS. PRIMARY SUPPLY VOLTAGE IN ACCORDANCE WITH SECTION 2.1055 (d) (1)

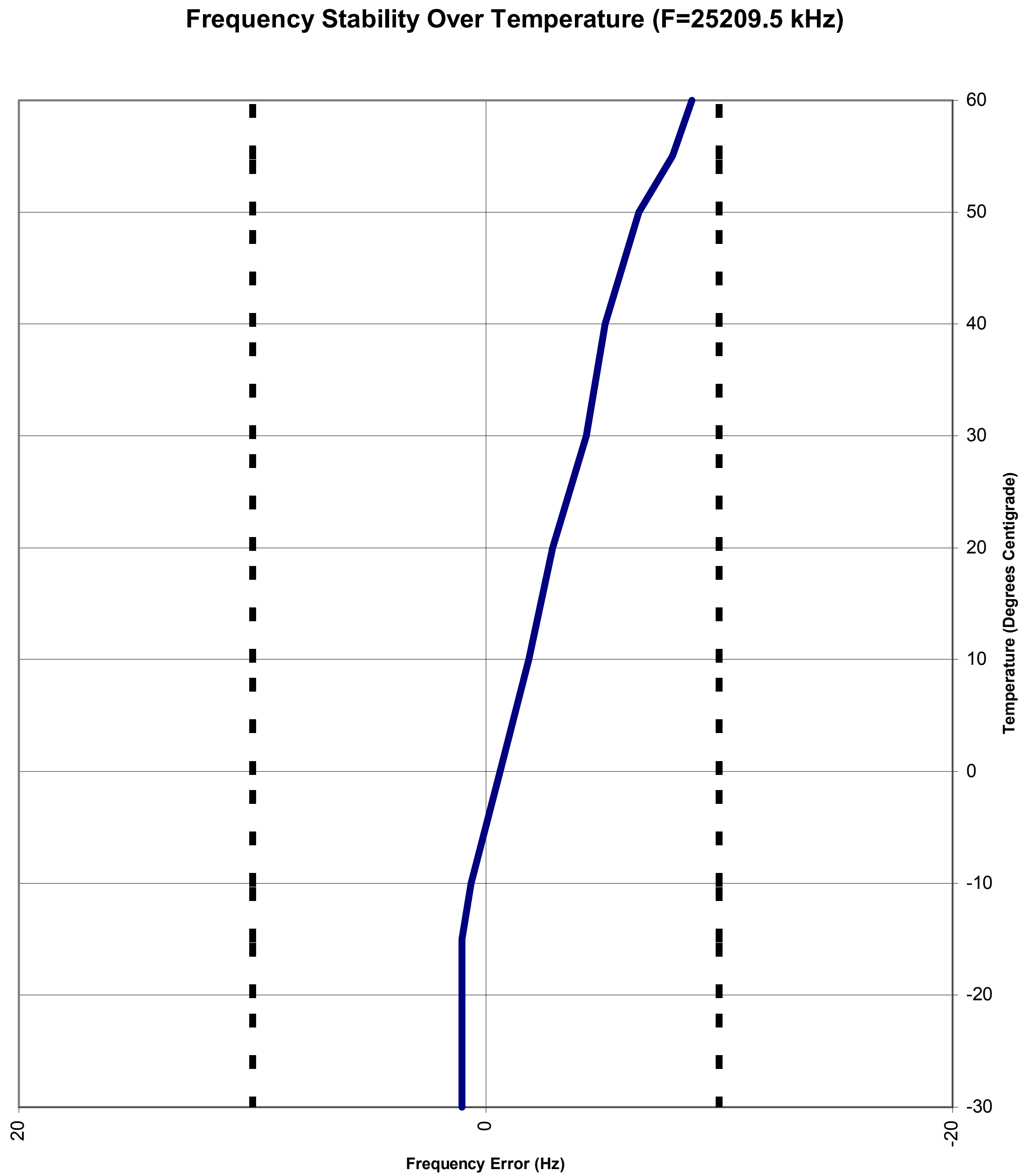

FIGURE 9.3 TEST DATA, FREQ STABILITY VS TEMPERATURE TEST

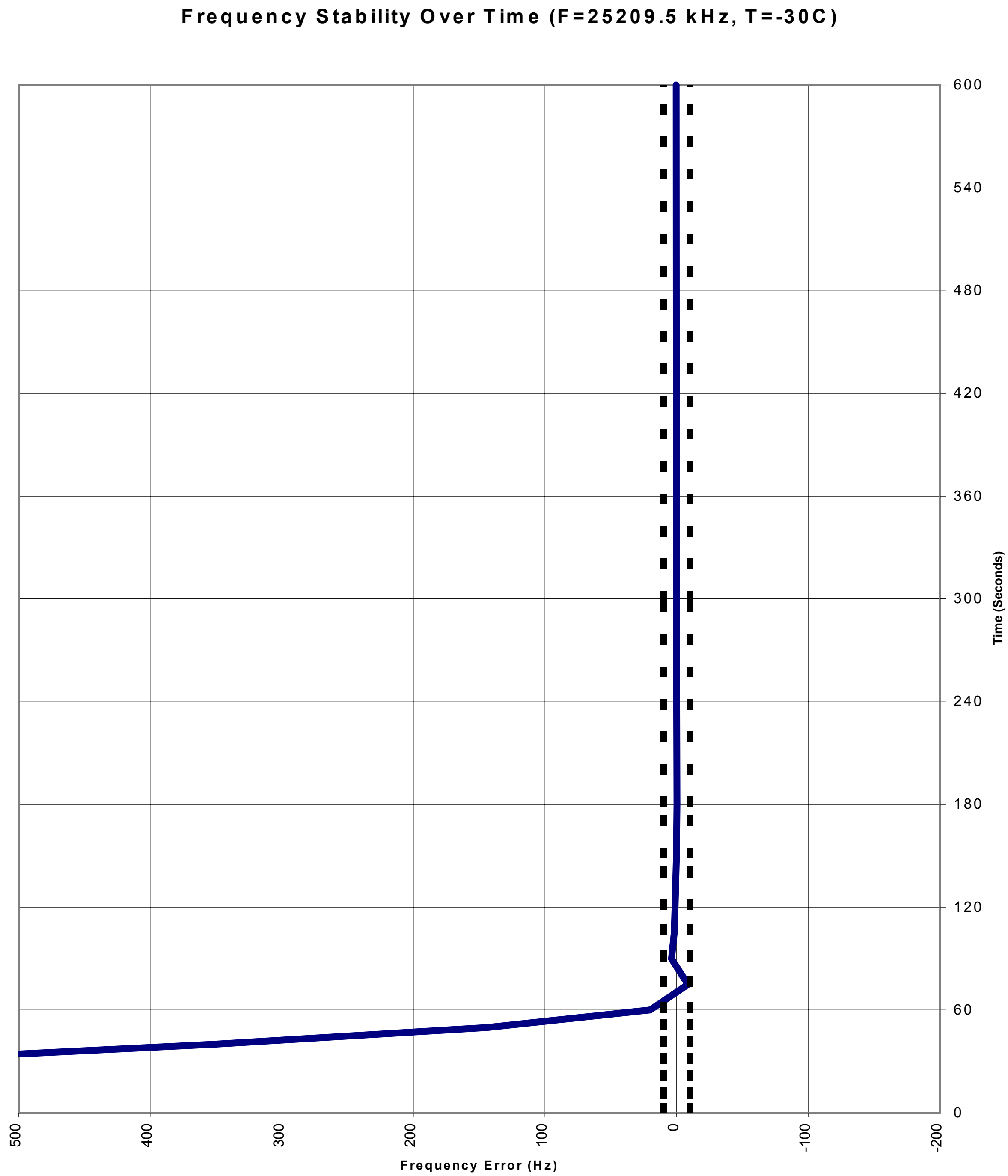

FIGURE 9.4 TEST SETUP, FREQ STABILITY VS TIME AT –30 C TEST

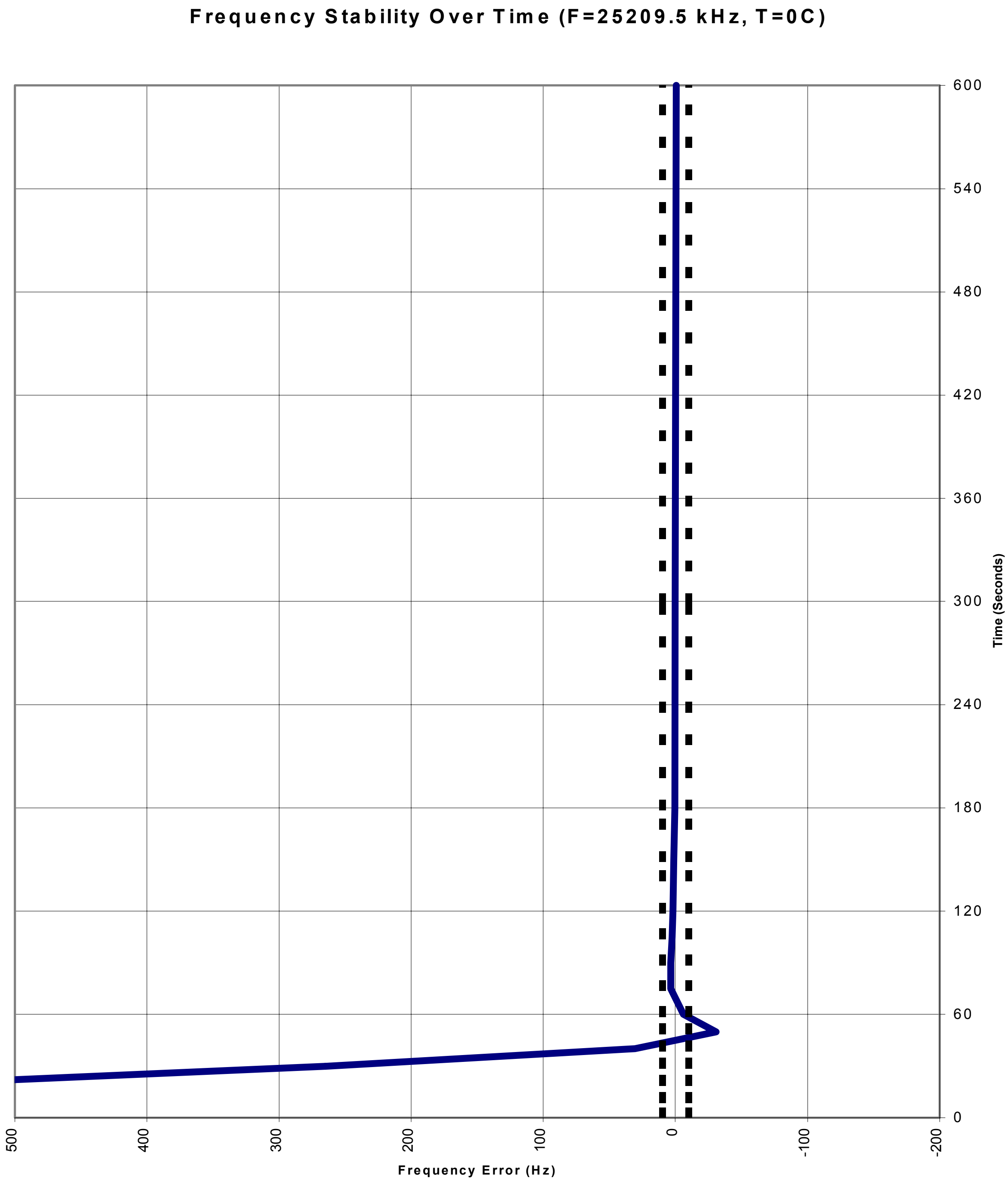

FIGURE 9.5 TEST SETUP, FREQ STABILITY VS TIME AT 0 C TEST

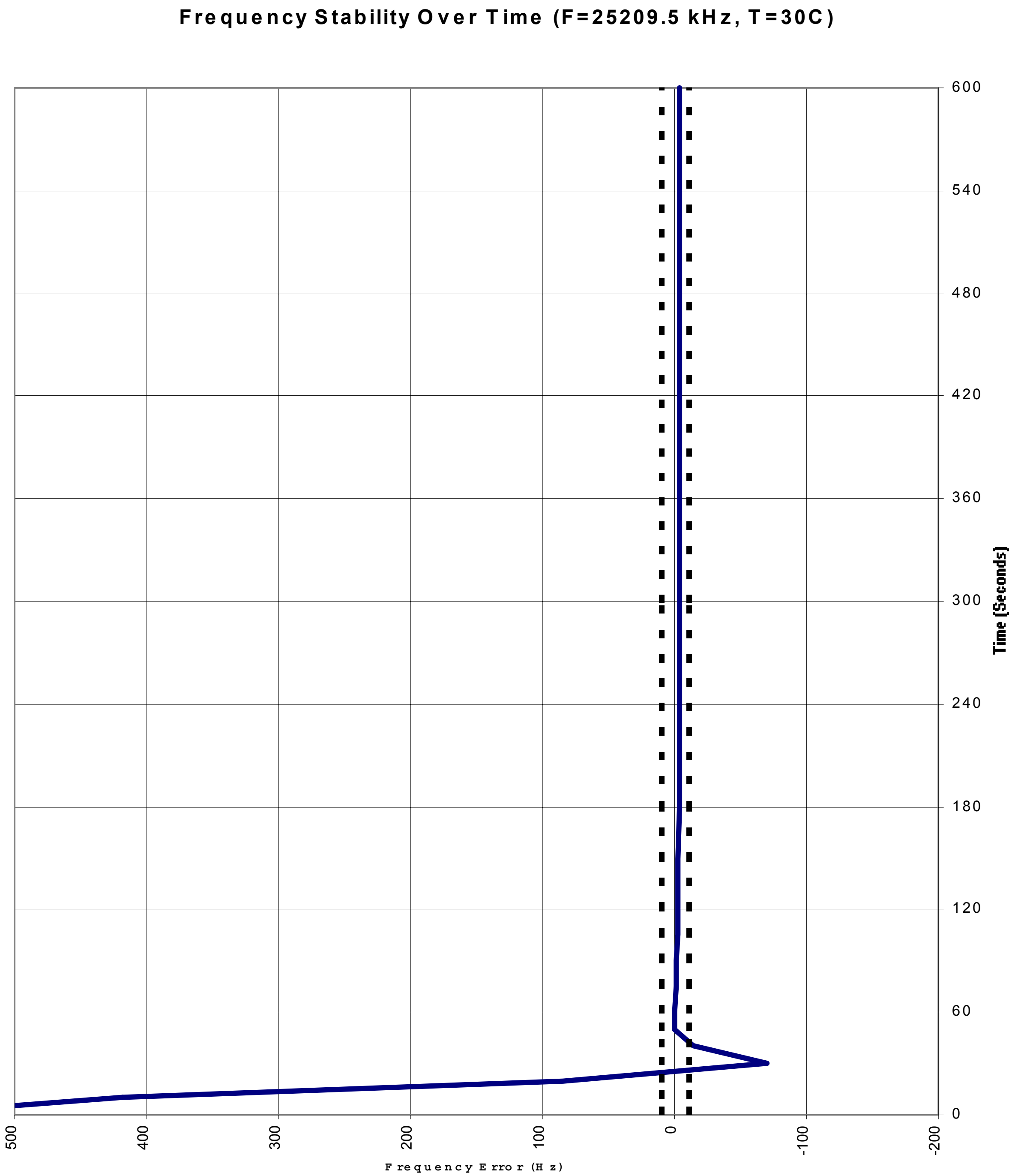

FIGURE 9.6 TEST SETUP, FREQ STABILITY VS TIME AT +30 C TEST

EXHIBIT 10 : FCC 2.1057 (FREQUENCY SPECTRUM TO BE INVESTIGATED)

Part 2.1057 Frequency Spectrum to be Investigated

FCC Part 2.1057, "Frequency spectrum to be investigated," requires that "in Part 2.1051 and 2.1053 of this part, the spectrum should be investigated from the lowest radio frequency generated in the equipment up the at least the 10th harmonic of the carrier frequency or to the highest frequency practicable in the present state of the art of measuring techniques, whichever is lower."

In Parts 2.1051 and 2.1053 of this report, measurement is done with a spectrum analyzer, Hewlett Packard Model 8568B.

In Part 2.1051, the computer-generated plots were not extended beyond 100 MHz because of the limited resolution of such a scan. However, the spectrum was investigated to 1500 MHz with the HP 8568B.

In Part 2.1053, the HP 8568B was used to provide good resolution and sensitivity when investigating spurious signals. The upper frequency limit of the HP 8568B is 1.500 MHz, which allows investigation of the 10th harmonic of internally generated signals up to 150 MHz as well as all output frequency channels of the transceiver under test. The HIGHEST output frequency in the transceiver under test is 29.999 MHz. Investigation of spurious radiation to 1500 MHz revealed no discernable radiation at frequencies above approximately 300 MHz. For this reason it was not necessary to calibrate the test site at frequencies above 400 MHz.

EXHIBIT 11 : FCC 2.1033(c) (RADIOTELEPHONE TWO-TONE ALARM)

Part 2.1033(c) Radiotelephone Two-Tone Alarm

Part 80.221 Special Requirements for Automatically Generating the Radiotelephone Alarm Signal

(a) Each device for automatically generating the radiotelephone alarm signal must be capable of being disabled to permit the immediate transmission of a distress call and message.

The alarm generator in the SEA 245 complies with this requirement. Selecting the alarm off function while the alarm is operating can instantly disable the operation of the alarm generator in EITHER the "Alarm Test" or "Transmit Alarm" mode.

(c) Devices installed on or after January 1, 1983 must comply with the following requirements:

(1) The frequency tolerance of each tone must be ± 1.5 percent;

The alarm tones in the SEA 245 are generated by software in the DSP and the on-off times are established by timing loops in the mainboard CPU. Both digital systems are synchronized to the primary system clock which provides a stability of greater than ±0.4 parts per million, resulting in essentially zero frequency shift of the alarm tones over the operating temperature range (-30 C to +60 C) of the equipment. Similarly, essentially zero frequency shift is experienced with changes in line voltage.

(2) The duration tolerance of each tone must be ± 10 milliseconds;

The tone duration tolerance is again a function of the stability of the primary system clock oscillator. The actual duration is a function of the software timing loop in the mainboard CPU. The measured duration of each tone is:

1300 Hz tone duration = 249 ms.

2200 Hz tone duration = 249 ms.

No measurable change in duration noted from -30 to +60 degrees C or with power line voltage changes of ± 15%.

(3) The interval between successive tones must not exceed 4 milliseconds;

The two alarm tones are generated as phase continuous sine waves by the DSP. The tone-tone delay is thus essentially zero and remains so throughout the operating temperature range of -30 to +60 degrees C.

(4) The amplitude ratio of the tones must be flat within 1.6 dB;

The two tones are set to the same amplitude by the DSP system.

(5) The output of the device must be sufficient to modulate the associated transmitter for H2B emission to at least 70 percent, and for J2B emission to within 3 dB of the rated peak envelope power;

The tones are generated by the DSP system, which also provides the system VOGAD and ALC. Thus, the amplitude level is constantly maintained at full rated peak envelope power.

(6) Light from the device must not interfere with the safe navigation of the ship;

No separate lighting system is provided for the auto-alarm function key. The panel illumination of ALL controls on the SEA 245 can be reduced to zero if desired.

(7) After activation the device must automatically generate the radiotelephone alarm signal for not less than 30 seconds and not more than 60 seconds unless manually interrupted;

Alarm duration is controlled by a CPU timing loop which is controlled by the system master clock. Nominal alarm signal duration is set to 45 seconds. No measurable change in the alarm duration was noted over the temperature range of -30 to +60 degrees C.

(8) After generating the radiotelephone alarm signal after manual interruption the device must be immediately ready to repeat the signal;

The alarm generator in the SEA 245 complies with this requirement.

(9) The transmitter must be automatically switched from the stand-by condition to the transmit condition at the start and return to the stand-by condition at the conclusion of the radiotelephone alarm signal.

The alarm generator in the SEA 245 complies with this requirement.

(d) Any device used by a station to automatically generate the radiotelephone alarm signal must be certified by the Commission.

The purpose of this report is to provide sufficient information to allow the Commission to grant certification to the internal auto-alarm generator in the SEA 245.

Figure 11.1 (Page 11-3) illustrates the test setup used to measure the alarm generator parameters for the above listed requirements.

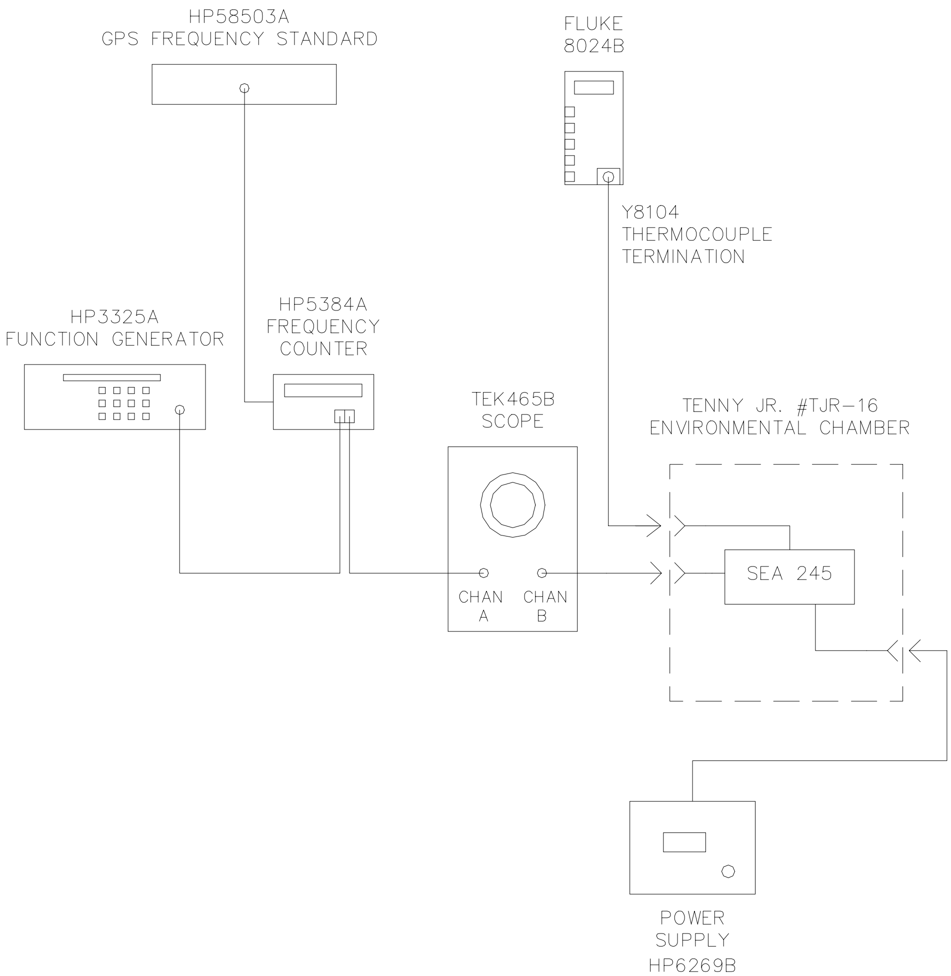

FIGURE 11.1 TEST SETUP, FREQ STABILITY VS TEMPERATURE AND VOLTAGE

EXHIBIT 12 : FCC 80.203(n), 80.225(a), 80.1101(b)(c)(3) (DSC REQUIREMENTS)

DECLARATION OF COMPLIANCE

The SEA 245 MF/HF Radiotelephone/DSC Controller (FCC ID: BZ6SEA245) incorporates a Class A Digital Selective Calling Controller. The DSC Controller complies with all FCC regulations given in 47 CFR 80.1101 (b), 47 CFR 80.1101 (c) (2), 47 CFR 80.203(n) and 47 CFR 80.225. This encompasses compliance with the following documents, which are included by reference:

80.1101 (b) (1)	IMO Resolution A.694(17)
(2)	ITU-T Recommendation E.161
(3)	ITU-T Recommendation Q.11
(4)	IEC Publication 92-101
(5)	IEC Publication 533
(6)	IEC Publication 945
(c) (3) (i)	IMO Resolution A.610(15)
(ii)	ITU-R Recommendation M.493-4
80.225 (a)	ITU-R Recommendation M.493 Class A

The following documents also cited in the aforementioned paragraphs do not apply to this equipment:

80.1101 (b) (7)	ISO Standard 3791

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Note: Signed copy provided as separate attachment